SPM

Flow Control, Inc.

PRODUCT SAFETY GUIDE

TABLE OF CONTENTS

SUBJECT	*PAGES*
General Safety Data for All SPM Products.....	**1-1 thru 1-6**
Plug Valves.....	**2-1 thru 2-8**
Check Valves.....	**3-1 thru 3-7**
Butterfly Valves.....	**4-1 thru 4-4**
Swivels and Hose Loops.....	**5-1 thru 5-8**
Unions and Union End Products.....	**6-1 thru 6-6**
Relief Valves.....	**7-1 thru 7-7**
Well Service Pumps.....	**8-1 thru 8-8**

© SPM 1995

Working Information on the "Safe Use" of SPM Products

GENERAL SAFETY DATA FOR ALL SPM PRODUCTS

It is critical that, since most SPM products generate, control or direct pressurized fluids, those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly.

!! WARNING !!

MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM products. This information is not meant to replace existing Company's safety policies or practices.

Scope:

SPM provides performance, design and inspection recommendations for all its products. This manual covers the products listed below:

* Unions & Treating Pipe
* Integral Union Connections
* Pressure Vessel Components & Assemblies
* Check Valves
* Swivels
* Plug Valves
* Relief Valves
* Butterfly Valves
* Well Service Plunger Pumps

Very specific safety recommendations can be found in this SPM Safety Guide; in Safety Bulletins provided by SPM, or shipped with SPM products; and in SPM's Technical Manual. FAILURE TO ADHERE TO THESE SAFE PRACTICE RECOMMENDATIONS CAN RESULT IN SERIOUS INJURY OR DEATH. You should not use any SPM product unless you have knowledge of and understand its safe use, maintenance, and proper handling procedures.

Responsibility & Proper Use:

Most SPM products are pressure vessels or work around pressure vessels. They are engineered and manufactured under strict specifications and inspected accordingly. Each product has a published working pressure or working specification guide that must not be exceeded (see product literature). CAUTION: RATED WORKING PRESSURE NOT TO BE EXCEEDED! Proper use and inspection is the responsibility of the end user, our valued customer. SPM provides technical literature for all of its products. Consult factory if technical data is not available or for clarification on any application or handling practice not specifically covered by this manual.

Types of Service:

* **Standard Service:** Refers to pressure vessels that are used with standard well treating fluids at ambient temperature.

* **H_2S Service:** Refers to any product or products that are used when H_2S may be present in a fluid or gaseous state.

* **Severe Service:** Refers to pressure vessels that are used with gaseous energized fluids (i.e. CO_2, N_2) and pressure vessels that are used when the fluid temperatures are 0 Degrees Centigrade (32 Degrees Farenheit) or colder. These pressure vessels require special Charpy characteristics due to the brittle nature of extremely cold metal. Consult the factory when temperatures for cold service or severe service

Products could fall below -30° Farenheit or above 230° Farenheit for application approval.

NOTE:Consult the factory on any service, application or use not covered by this manual.

Product exposed to any unusual conditions or circumstances not specifically addressed in this Safety Manual should be returned to SPM for Engineering review.

Recommendations:

A. All SPM products as described in this report should be segregated and clearly identified by application, or use, in the following manner:

1. All energized fluids and gases, such as $C0_2$ and N_2, are to be contained by a designated string of treating iron. This string must be clearly identified and must not be used for any other purpose. Pipe threaded components should never be used for energized service. Only integral union style components should be used.

2. Acids and standard well fluids are to have a designated string and should not be used for any other purpose.

3. H_2S treating strings must also have a designated identification and always be used when H_2S is apparent or could be encountered. Pipe threaded components should never be used for H_2S Service. Only integral union type components, designed for this service, should be used!

4. Low Temperature treating strings are to have a designated identification and always be used when ambient temperatures or fluid temperatures below 0 Degrees Centigrade (32 Degrees Farenheit) are encountered. These strings must also be segregated for type of service, such as acids, standard well fluids, and energized fluids, and gases such as CO_2 and N_2.

5. Once a product has been placed in designated service, it should remain in that service application.

NOTE: All strings should have a designated service. A method of identifying each service string should be devised. Banding with 1" wide band with pertinent information engraved on band is recommended. Color coding with strict controls can be used. Using factory color coding is not recommended as some components have the same appearance and in many cases will interchange.

These service strings should be coded in such a way to be clearly identifiable, and all personnel must be thoroughly trained in the use of these products.

B. Each string should be pressurized to its maximum planned working pressure for each application prior to each use. The maximum working pressure of the lowest rated component must not be exceeded. All personnel must be at a safe distance or position when pressure is applied.

C. Pressure seal (line pipe) threads are not recommended for pulsating service above 10,000 psi or where side loading or erosion are suspected. Non-pressure seal (round tubing) threads or straight

integral connections are recommended under these conditions. In order to achieve the recommended Non-Shock Cold Working Pressure, power-tight make-up is required on threaded connections. Consult the factory for any usage other than normal constant flow working conditions.

D. Personnel must not be around pressure vessel products while pressure is present or being applied.

E. Each string, as well as each component, must have regular intervals of maintenance and inspection for safe, proper performance. These intervals should never exceed six (6) months. Inspection and maintenance should be recorded.

F. Flow rates above 42 feet per second are not recommended. Rates above 42 feet per second will cause accelerated wear.

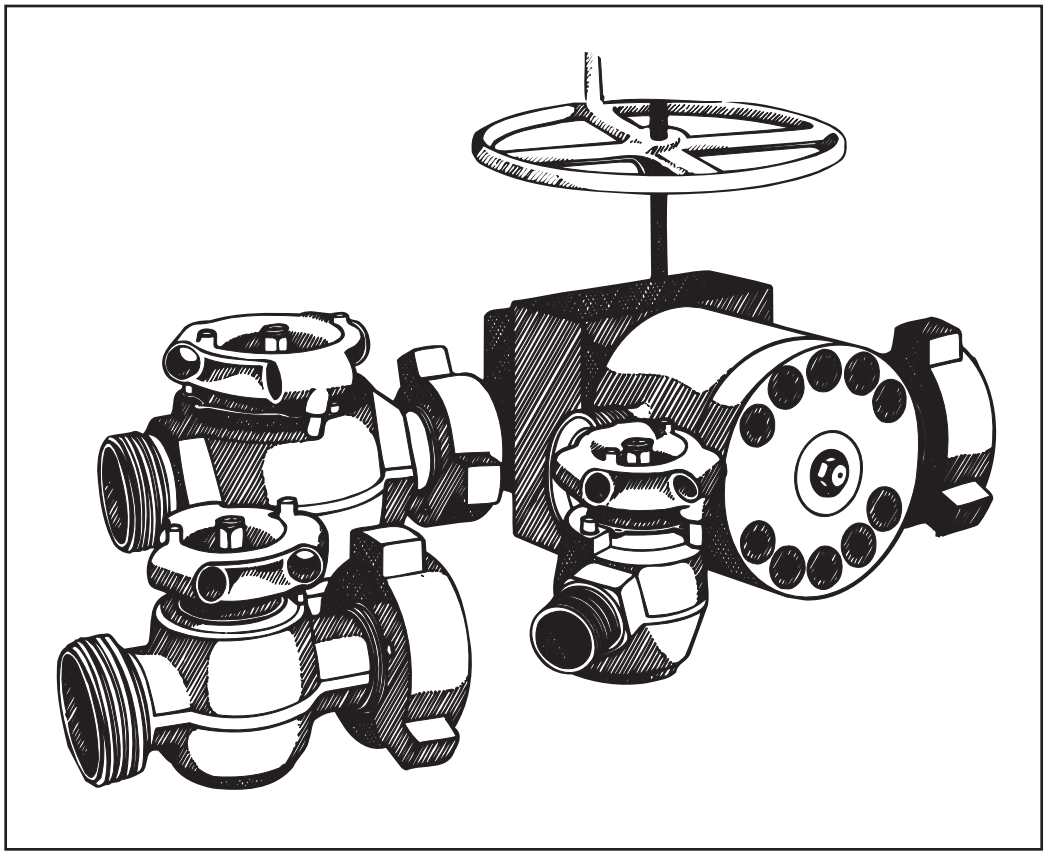
Certain abrasive media can also cause accelerated wear. Inspect at pre-determined regular intervals.

G. Welding, brazing, or heating on high pressure SPM components is prohibited.

!! WARNING !!

MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

SPM PRODUCT SAFETY GUIDE FOR PLUG VALVES



It is critical that, since most SPM products generate, control or direct pressurized fluids, those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly.

!!WARNING!!
MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM products. This information is not meant to replace any existing Company's safety policies or practices. It is important to read and understand the "General Safety Data for all SPM Products" and the SPM Product Safety Guide for "Union and Union End Products". Both of these are available from SPM.

Personal Responsibilities:

A-1 When using these assemblies, safety glasses, approved safety shoes and hard hat must be used. Hammering and lifting these assemblies must be done with caution. Where unions are present, read and understand the SPM Safety Guide for Unions and Union End Products.

A-2 Personnel should only hammer on makeup lugs and not strike union nut or valve body. Fractures can occur from repeated misuse. Excessive hammering can damage components.

A-3 Do not lift any valve that weighs in excess of 40 pounds. Use a lifting device if valves are to be used above head or when weight exceeds 40 lbs.

Proper leg lifting should be used when lifting. Back lifts should be avoided.

A-4 Only the proper actuator bar should be used to turn SPM plug valves. Valves require torque to operate. Makeshift bars can become dislodged easily and cause an accident. Use only an SPM actuator bar, part number 3P11542, for 1" and 2" Plug Valves. It is a personal responsibility to become

knowledgeable and trained in the proper use and handling of this tool.

A-5 Do not hammer on, or be around valve assemblies when pressure is present.

It is recommended that plug valves with SPM remote control actuators be used wherever possible. Hand actuation (with the appropriate actuator bar) should be done only by specially trained personnel under direct supervisory instruction; and only when necessary due to application.

On Location:

B-1 Proper transportation of plug valves is important. Racks that will secure valves and prevent accidental unloading are critical. Never transport any SPM product in a fashion that would allow it to become dislodged and cause an accident.

B-2 Valve unions should be clean and lightly oiled prior to each use. A visual inspection for damage should also be performed at this time. Union seals should be checked, and replaced when worn or damaged.

B-3 Each valve has a size and pressure code designated on the valve. Use this code for proper mating and pressure limits.

!! CAUTION !!

SINCE PLUG VALVES MAY BE REPAINTED IN DIFFERENT COLORS FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS PRIMARY MEANS OF IDENTIFICATION.

B-4 Threaded end plug valves should not be used for H_2S service. Only integral type plug valves should be used when sour gas is present. These must be valves specially designed and designated for use with H_2S service.

B-5 Valve usage should be monitored by a qualified supervisor or foreman. Supervisory personnel must approve proper placement, position, and handling of all plug valves in the system. Only specially trained personnel under direct supervisory instruction, should actuate valves under pressure.

B-6 Prior to applying pressure, valves should be greased in both the opened and closed position. This should be done before each use. If valve is excessively hard to operate, it should be removed and not used until repairs are made.

B-7 It is sometimes necessary to turn valves when pressure is present. It is recommended that remote control actuators be used for this purpose. If this is not feasible, then only experienced specially trained personnel under direct supervisory instruction should perform this task.

B-8 Venting flammable or explosive gases to the atmosphere through individual SPM plug valves must be avoided. Choke manifolds are available from SPM and should be used for this purpose. If used for bleeding, ample anchoring of the valve manifold must be done. Specially designed torture valves are available from SPM for bleedoff applications. **GASES, OR FLUIDS CONTAINING GASES, WILL CAUSE VALVES TO WHIP AND CAN CAUSE SERIOUS INJURY OR DEATH!**

SPM recommends that remote controlled valves be used for these applications.

B-9 When opening an SPM plug valve under pressure, the initial torque to start the stem turning is always greater than the moving torque. You must position your body to be able to compensate for this change.

B-10 Do not position any part of your body in the path of exit flow of the valve.

B-11 Do not position the exit of any plug valve, used for bleeding, where rocks or debris may be picked up by the exit stream.

B-12 If any valve becomes plugged, or does not operate properly, contact a supervisor immediately. DO NOT look into the end of the valve to check for debris, blockage, or for any other reason.

B-13 If valve is slow to open or close, remove it from service. Do not hammer on the valve's actuator cap.

B-14 It is recommended that a rate in excess of 42 feet per second be avoided. Rates above this will cause a more rapid wear and erosion.

B-15 Flush clean and grease after each job with water and the proper SPM valve grease. Use only an SPM pressure rated gun for greasing.

Special Precautions:

C-1 Welding, brazing, or heating on SPM plug valves is prohibited.

C-2 Valve operation sometimes require personnel to be around pressured lines. Experienced personnel only should be dispatched for this purpose. Exposure time should be a minimum. Always use remote controlled valves whenever possible. Never look into, or position yourself in, the path of the exit flow of the valve.

C-3 Never alternate a valve's service. Acid service should never be followed by cold temperature service. When acid etching or erosion is present, replace the valve.

C-4 SPM offers specially designed valves for torture service, cold temperature service, H2S service, and aromatic service. Only valves designed and approved for these special services should be used in these applications.

C-5 Each integral union connection is clearly marked with a pressure code (i.e. "1502", 15,000 psi). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections must match (according to size, pressure rating, etc.). These connections must also match the service of the designated string they are installed in.

Inspection - Repair - Testing:

D-1 Valves should be greased after each use. Use only the following SPM gun and grease.

Lube Grease:
Standard Temperature.....P13336
Low Temperature..... P13337
Gun Assembly.....P13335

D-2 Any alteration of the SPM valve is prohibited.

D-3 Use only repair methods as outlined by SPM valve service literature. Use only the proper SPM repair tools. Wall charts and instruction sheets are available from SPM.

D-4 SPM Repair Kits should be used for repair. Valve Body and all components must be clean and SPM assembly grease used.

Assembly Grease:
Standard Temperature.....P14189
Low Temperature..... P14443

D-5 Threaded end plug valves must have the API pipe threads inspected at least every 90 days. These threads are right hand threads. Turning counter-clockwise, or to the left, will unscrew the valve. This must never be done while the valve is in service. Always make sure any threaded component is correctly made up per the API or SPM standard.

D-6 Pressure seal (line pipe) threads are not recommended for pulsating service above 10,000 psi, or where side loading or erosion are suspected. Straight integral connections are recommended under these conditions. In order to achieve the rated Non-Shock Cold Working Pressure, API thread compound and power-tight make-up is required. Consult the factory for any usage other than normal constant flow conditions.

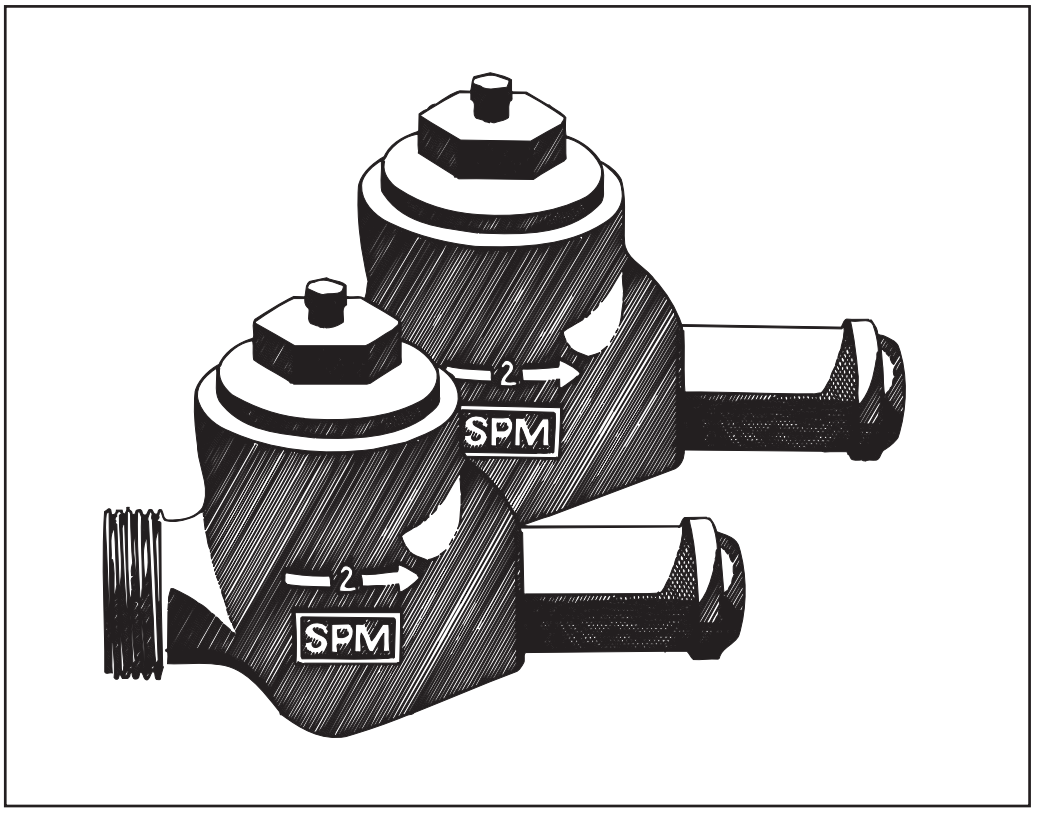
D-7 SPM recommends that weld repair not be attempted on its product. Replacing worn components is a more effective and safe approach.

D-8 Valves should be fully disassembled, inspected, and pressure tested at least every 6 months and always tested after each repair. The valve should be tested in an opened and in a closed position. Personnel should be a safe distance during pressure cycles. They should never look into, or position themselves in the exit flow path of the valve.

D-9 Pressure testing should be done with cold water. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!

!! CAUTION !!
THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.

SPM PRODUCT SAFETY GUIDE
FOR
CHECK VALVES
CLAPPER AND DART STYLE



It is critical, that since most SPM products generate, control or direct pressurized fluids, those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly.

!!WARNING!!
MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM products. This information is not meant to replace any existing Company's safety policies or practices. It is important to read and understand the "General Safety Data for all SPM Products" and the SPM Product Safety Guide for "Union and Union End Products". Both of these are available from SPM.

Personal Responsibilities:

A-1 When using these assemblies, safety glasses, approved safety shoes, and hard hat must be used. Hammering and lifting these assemblies must be done with caution. Where unions are present, read and understand the SPM Safety Guide for Unions and Union End Products.

A-2 Personnel should only hammer on makeup lugs and not strike union nut or valve body. Fractures can occur from repeated misuse. Excessive hammering can damage components.

A-3 Do not lift any valve that weights in excess of 40 pounds. Use a lifting device if valves are to be used above head or when weight exceeds 40 lbs.

Proper leg lifting should be used when lifting. Back lifts should be avoided.

A-4 It is a personal responsibility to use the proper tools when working on or with check valves. It is a personal responsibility to be knowledgeable and trained in the use and handling of these tools.

On Location:

B-1 Proper transportation of check valves is important. Racks that will secure valves and prevent accidental unloading are critical. Never transport any SPM product in a fashion that would allow it to become dislodged and cause an accident.

B-2 Valve unions should be clean and lightly oiled prior to each use. A visual inspection for damage should also be performed at this time. Union seals should be checked and replaced when worn or damaged.

B-3 Before assembly into a fluid line, check the direction of flow indicated by the arrow on the body, and make sure the valve is properly oriented in the line. Improperly directed check valves will shut off fluid flow and can result in SERIOUS INJURY OR DEATH!

B-4 Clapper style check valves must be used in a flat, horizontal position. If these valves are to be used otherwise, make sure the position will allow gravity to close valve. Dart style valves utilize a spring to close, and may be oriented in any position. Check valves must be flushed with water after each use.

B-5 Each valve has a size and pressure code designated on the valve. Use this code for proper mating and pressure limits.

!! CAUTION !!

SINCE CHECK VALVES MAY BE REPAINTED IN DIFFERENT COLORS FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS PRIMARY MEANS OF IDENTIFICATION.

B-6 Do not hammer or tamper with any SPM check valve when pressure is present.

B-7 Personnel must maintain a safe distance from check valves when pressure is present.

B-8 Always verify the check valve is operating properly during test. If not, remove from service.

B-9 It is recommended that a rate in excess of 42 feet per second be avoided. Rates above this will cause a more rapid wear and erosion.

B-10 Always flush valve with water, then oil after each use.

Special Precautions:

C-1 Welding, brazing or heating check valves is prohibited. Material damage will occur.

C-2 If valves are used with acid services, they should be washed with fresh water as soon as possible. After washing, it is recommended to be submersed in light oil for 5 minutes.

C-3 WARNING:IMPROPERLY DIRECTED CHECK VALVES CAN CAUSE SERIOUS INJURY OR DEATH!

C-4 Never alternate a valve's service. Acid service should never be followed by cold temperature service. When acid etching or erosion is present, replace the valve.

C-5 When installing union end check valves, proper mating is required. Each integral union connection is clearly marked with a pressure code (i.e. "1502",

damage, deterioration or washing. This is especially true of caps with pipe plugs. Any ported cap valve must be inspected every 60 days for wash, erosion, or corrosion and replaced when these conditions are noted. (SPM strongly discourages the sale of valves with ported caps, and recommends that valves being repaired have their ported caps replaced with plain caps.)

D-5 Dart and Clapper valve seats should be checked for washing or corrosion. If evidence exists, replace parts or valve.

D-6 Any check valve that has been exposed to high shock loads (i.e. overpressure, sandoffs, etc.) should be removed from service until ultrasonic checks and pressure testing can be performed.

D-7 If any abnormal situations occur, ship the valve back to SPM for an Engineering review before returning it to service.

D-8 When pressure testing, the pressure should be applied to the total body area as well as the check system side.

D-9 Pressure testing should be done with cold water. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!

D-10 SPM recommends that weld repair not be attempted on its product. Replacing worn components is a more effective and safe approach.

damage, deterioration or washing. This is especially true of caps with pipe plugs. Any ported cap valve must be inspected every 60 days for wash, erosion, or corrosion and replaced when these conditions are noted. (SPM strongly discourages the sale of valves with ported caps, and recommends that valves being repaired have their ported caps replaced with plain caps.)

D-5 Dart and Clapper valve seats should be checked for washing or corrosion. If evidence exists, replace parts or valve.

D-6 Any check valve that has been exposed to high shock loads (i.e. overpressure, sandoffs, etc.) should be removed from service until ultrasonic checks and pressure testing can be performed.

D-7 If any abnormal situations occur, ship the valve back to SPM for an Engineering review before returning it to service.

D-8 When pressure testing, the pressure should be applied to the total body area as well as the check system side.

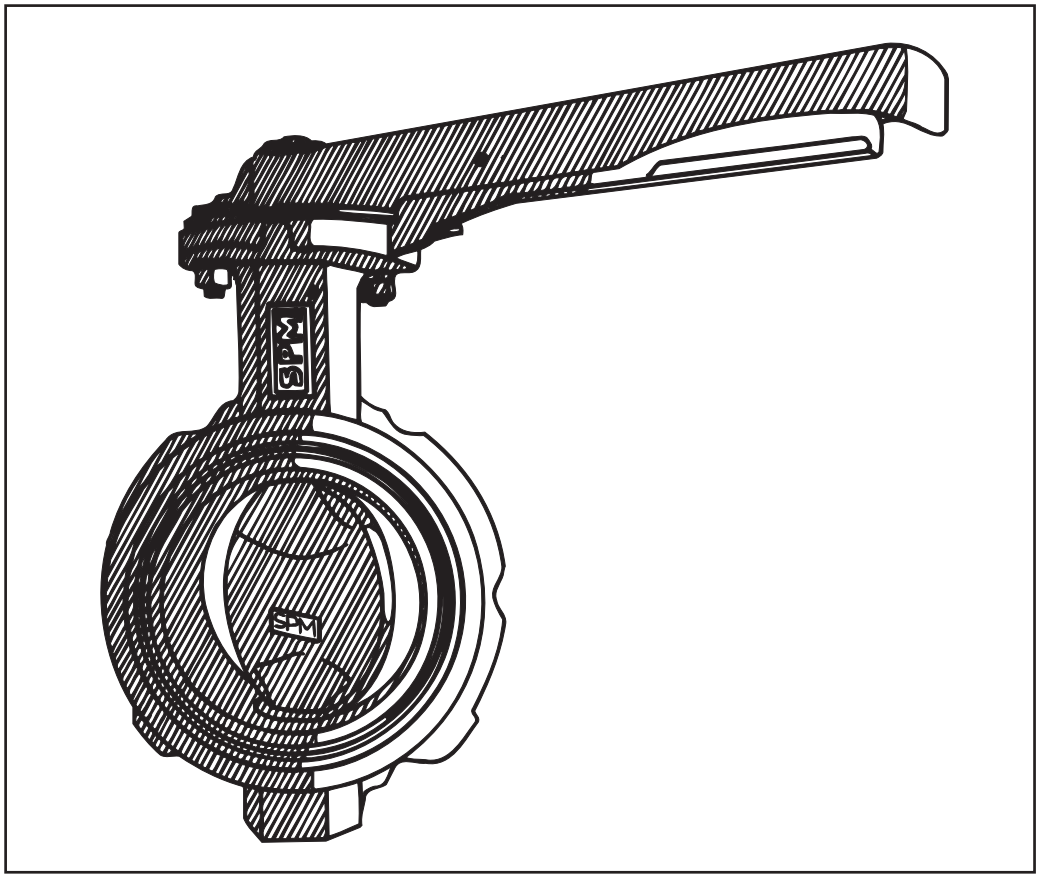
D-9 Pressure testing should be done with cold water. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!

D-10 SPM recommends that weld repair not be attempted on its product. Replacing worn components is a more effective and safe approach.

!! CAUTION !!
THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.

SPM PRODUCT SAFETY GUIDE FOR

BUTTERFLY VALVES



It is critical, that since most SPM products generate, control or direct pressurized fluids, those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly.

!!WARNING!!
MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM products. This information is not meant to replace existing Company's safety policies or practices. It is important to read and understand the "General Safety Data for all SPM Products".

Personal Responsibilities:

A-1 When using these assemblies, safety glasses, approved safety shoes and hard hat must be used.

A-2 Do not lift any valve that weighs in excess of 40 pounds. Use a lifting device if valves are to be used above the head or when weight exceeds 40 lbs.

Proper leg lifting should be used when lifting. Back lifts should be avoided.

A-3 It is a personal responsibility to use the proper handle to turn SPM Butterfly Valves. Valves require torque to operate. Makeshift handles can become dislodged easily and cause an accident. Use only an SPM handle.

A-4 Working around pressurized fluid, even low pressure, is dangerous. For safety, it is recommended that butterfly valves with SPM remote control actuators be used wherever possible.

On Location:

B-1 Most sizes of SPM butterfly valves are limited to a maximum working pressure of 175psi. They should not be confused with, or used in place of any high pressure valves.

B-2 Butterfly valves normally are flange mounted and are installed in semi-permanent fashion (i.e. truck, trailer, or skid mounted manifolds). These products are not usually assembled or disassembled on the job site.

B-3 When opening an SPM butterfly valve under pressure, the initial torque to start the stem turning is always greater than the moving torque. You must position your body to be able to compensate for this change.

B-4 Do not position any part of your body in the path of exit flow of the valve.

B-5 If any valve becomes plugged or does not operate properly, contact a supervisor immediately. DO NOT look into the end of the valve to check for debris or any type of blockage.

B-6 If valve is slow to open or close, remove it from service. Do not hammer on the valve's handle.

Special Precautions:

C-1 A wide variety of fluids and bulk materials can be conveyed through the valve. It is important that the appropriate seal compound, disk, and stem material be selected for the application. Improper use can result in PERSONAL INJURY OR DEATH. Consult factory for specific recommendations.

C-2 Welding, brazing or heating butterfly valves is prohibited. Material damage will occur.

Inspection - Repair - Testing:

D-1 Any alteration of the SPM valve is prohibited.

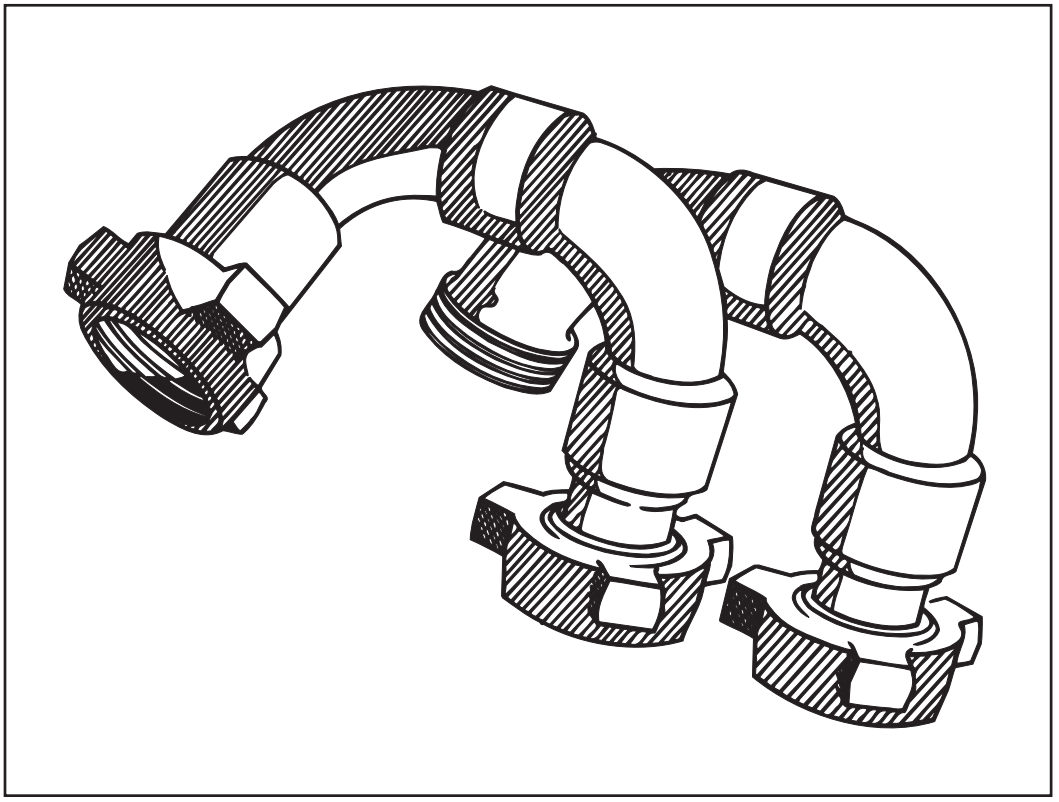
D-2 Use only SPM repair kits while repairing units. Follow detailed redressing instructions enclosed with each kit.

D-3 Valves should be fully disassembled, inspected, and pressure tested at least every 6 months and always tested after each repair. The valve should be tested in an opened and in a closed position. Personnel should be a safe distance during pressure cycles. Personnel should never look into the valve or position themselves in the exit flow path of the valve.

D-4 Pressure testing should be done with cold water. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!

!! CAUTION !!
THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.

SPM PRODUCT SAFETY GUIDE FOR SWIVEL JOINTS AND STEEL HOSE LOOPS



It is critical, that since most SPM products generate, control or direct pressurized fluids, those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly.

!!WARNING!!
MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM products. This information is not meant to replace any existing Company's safety policies or practices. It is important to read and understand the "General Safety Data for all SPM Products" and the SPM Product Safety Guide for "Union and Union End Products". Both of these are available from SPM.

Personal Responsibilities:

A-1 When using these assemblies, safety glasses, approved safety shoes, and hard hat must be used. Hammering and lifting these assemblies must be done with caution. Where unions are present, read and understand the SPM Safety Guide for Unions and Union End Products.

A-2 Personnel should only hammer on makeup lugs and not strike union nut or swivel components. Fractures can occur from repeated misuse. Excessive hammering can damage components.

A-3 Do not lift any swivel that weighs in excess of 40 pounds. Use a lifting device if assemblies are to be used above head or when weight exceeds 40 lbs.

Proper leg lifting should be used when lifting. Back lifts should be avoided.

A-4 Swivels that are provided with a safety chain must be used properly.

A-5 It is a personal responsibility to be knowledgeable and trained in the use and handling of these products.

On Location:

B-1 Storage and transportation of swivel joints should be done in a safe manner. Do not transport any assembly that may become dislodged and cause an accident.

B-2 Swivel unions should be clean and lightly oiled prior to each use. A visual inspection for damage should also be performed at this time. Union seals should be checked and replaced when worn or damaged.

B-3 Each swivel has a size and pressure code designated on the assembly. Use this code for proper mating and pressure limits.

!! CAUTION !!

SINCE SWIVELS MAY BE REPAINTED IN DIFFERENT COLORS FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS PRIMARY MEANS OF IDENTIFICATION.

B-4 Threaded end swivels should not be used for H_2S service. Only integral type swivels should be used when sour gas is present. These must be swivels specially designed and designated for use with H_2S service.

B-5 Swivels require maintenance. Swivel sections must be greased and free to rotate without binding. Any swivel that is excessively hard to rotate while hooking up or breaking down should be repaired before use. Swivels that leak at low or high pressure should be repaired or replaced.

B-6 Swivels are designed for ease of hook-up and minimal line movement. Using SPM swivels for continuous rotation under pressure is strictly prohibited. Swivels are not designed for continuous rotation, even at very low pressure.

B-7 Swivel sections must not be pressured beyond their rated working pressure in field service or field testing.

B-8 Swivels are not designed for side loading. Loading that will induce a bending moment into the ball races is prohibited. To prevent the above, a five point movement is recommended at all turns. This will allow the swivel to accommodate the free movement of the lines.

B-9 It may be necessary to use a single swivel to tie treating line to a well head, or other devices above ground level. In this situation, the hookup line from swivel to ground should be placed at an angle of 45° or greater. This will prevent side loading of the assembly.

B-10 Always make sure the swivel hookup is done in such a manner to insure that threaded connections do not unscrew during operation.

B-11 Monitor the condition of swivels used in an area where a permanent hookup is required. Frame flexing or structure movements must not place swivels in an improper side loaded condition.

B-12 Do not hammer or tamper with any SPM swivel when pressure is present.

B-13 It is recommended that a rate in excess of 42 feet per second be avoided. Rates above this will

cause a more rapid wear and erosison.

B-14 Always flush swivel with water, then oil after each use.

Special Precautions:

C-1 Welding, brazing or heating swivels is prohibited. Material damage will occur.

C-2 Do not restrain free movement of SPM swivels. Damage will occur, which could result in injury or death.

C-3 If swivels are used with acid services, they should be washed with fresh water as soon as possible. After washing, it is recommended to be submersed in light oil for 5 minutes.

C-4 Never alternate a swivel's service. Acid service should never be followed by cold temperature service. When acid etching or erosion is present, replace the swivel.

C-5 When installing union end swivels, proper mating is required. Each integral union connection is clearly marked with a pressure code (i.e. "1502" 15,000 psi). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections used must match (according to size, pressure rating, etc.). These connections must also match the service of the designated string they are installed in.

Inspection - Repair - Testing:

D-1 Ultrasonic inspection should be performed every

year on the curved section of the swivel. Inspection should be done more frequently (every 3 to 6 months) when the swivel is used with sand laden material. Replace the swivel if there is 20% or more wall loss from washing or corrosion (refer to service literature). Replacement components are available. Visually inspect prior to each use and verify that swivels rotate smoothly and are greased properly.

D-2 Swivels should be thoroughly inspected, serviced and/or repaired, at least every six (6) months. While assembly is torn down, a visual inspection for wear, corrosion, or erosion should be performed. In areas of high use, this type of inspection should be more frequent. Always visually inspect prior to each use.

D-3 If the swivel leaks, it should be removed from service for immediate repair or replacement. Fluids may leak into the ball race cavity. This area is highly susceptible to problems caused by caustic or acid type fluids. If the ball races show indications of acid contamination, replace the unit.

D-4 Use only SPM repair kits when repairing units. Follow detailed redressing instructions enclosed with each kit.

D-5 Pressure testing should be done with cold water. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!

D-6 Weld repair is prohibited for swivels.

!! CAUTION !!

THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.

General Information:

PRESSURE & TEMPERATURE RATING:

Standard Service SPM Long Radius Swivel Joints are designed for service to 15,000 psi non-shock cold working pressure. Nameplates and union nuts display the designated pressure ratings. Since nameplates are the primary means of identifying pressure rating of swivel joints, they must not be removed, painted or otherwise made unreadable.

The service and working pressure for any new swivel are also designated by the factory color. Examples of this are:

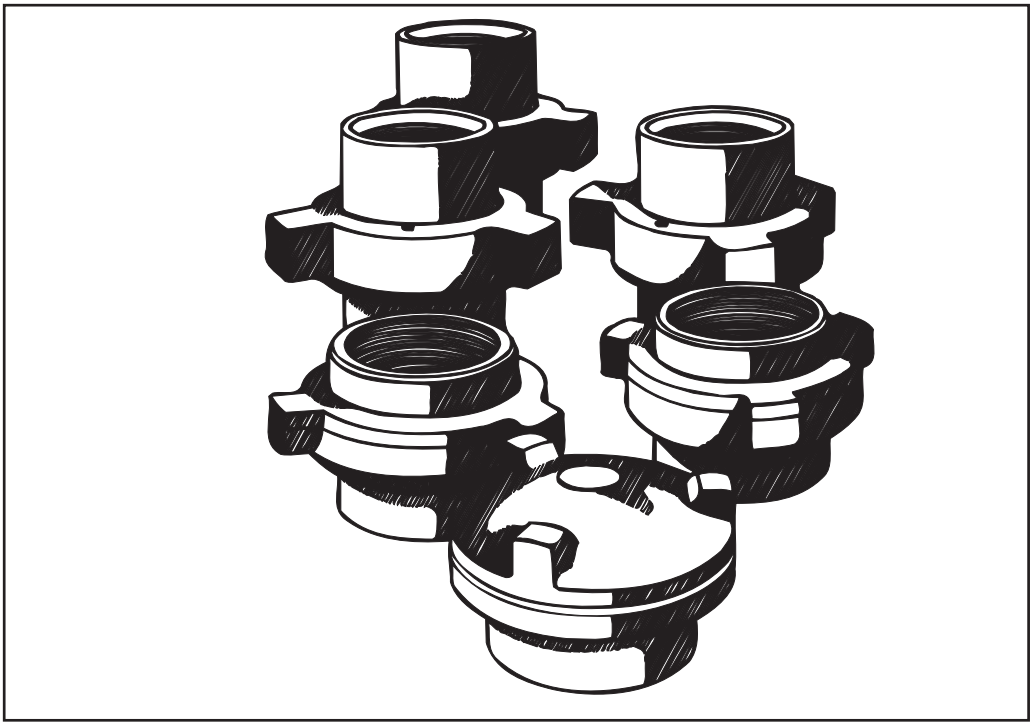
SERVICE	COLOR	MAXIMUM PRESSURE	MAXIMUM TEMP
STD	Red	15,000 psi (1034 bar)	230F (110C)
H_2S	Mint Green	10,000 psi (690 bar)	400F (240C)

!! CAUTION !!

SINCE SWIVEL JOINTS MAY BE REPAINTED IN DIFFERENT COLORS FOR VARIOUS APPLICATIONS, FACTORY COLOR ALONE SHOULD NOT BE USED AS THE PRIMARY MEANS OF IDENTIFICATION.

The maximum operating temperature for SPM swivels using nitrile packing is 230 degrees F (110 degrees C). The maximum operating temperature using fluorocarbon packing (for high temp or H2S) is 400F (240C). However, elastomeric packing may deteriorate more rapidly if exposed to well fluids at temperatures above 160 degrees F (71 degrees C). This occurs due to compression set, tearing, gas absorption and/or chemical attack. Minimum operating temperature is -22 degrees F (-30 degrees C).

SPM PRODUCT SAFETY GUIDE FOR UNIONS and UNION END PRODUCTS



It is critical, that since most SPM products generate, control or direct pressurized fluids, those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly.

!!WARNING!!
MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM products. This information is not meant to replace existing Company's safety policies or practices. It is important to read and understand the "General Safety Data for all SPM Products".

Personal Responsibilities:

A-1 When using unions, safety glasses, approved safety shoes and hard hats must be worn. Hammering on unions may cause foreign material or steel slags to become airborne. Hammering on unions may also cause sparks. Use only soft-type hammers. Steel headed hammers should be avoided.

A-2 Personnel should only hammer on makeup lugs and not strike union nut. Fractures can occur from repeated misuse. Excessive hammering on nut can damage hammer unions.

A-3 Personnel should never hammer on unions or treating pipe when pressure is present. Personnel should never be around unions or lines when pressure is applied.

A-4 It is a personal responsibility to use the proper tools when working with hammer unions or treating pipe. Individuals should be knowledgeable and trained in the use of these tools.

A-5 It is a personal responsibility to visually inspect each union prior to each use for damage, unusual or excessive wear, excessive hammering, cracks, wash or erosion, corrosion or etching, thread or seal damage or other abnormalities. Any questionable

component should be removed from service and submitted to a thorough inspection.

On Location:

B-1 Each union has a size and pressure code designated on the wing nut. Use this code for proper mating and pressure limits.

!! CAUTION !!

SINCE UNIONS MAY BE REPAINTED IN DIFFERENT COLORS FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS PRIMARY MEANS OF IDENTIFICATION.

B-2 Unions should be properly cleaned and lightly oiled before using. Union seals should be visually examined prior to makeup and replaced if worn, torn, or cracked.

B-3 Unions and treating pipe will stand some minor misalignment. However, placing piping where side loads are present is extremely dangerous and must be avoided.

B-4 Treating pipe should not be used to vent gaseous fluids or gas to the atmosphere. Line whip can occur, causing serious injury or death.

B-5 Any union or treating pipe section that has been pressurized beyond its specified working pressure must be replaced.

B-6 Do not hammer on, or be around union assemblies when pressure is present.

B-7 It is recommended that a rate in excess of 42 feet per second be avoided. Rates above this will cause a more rapid wear and erosion.

Special Precautions:

C-1 Welding, brazing or heating unions or treating pipe is prohibited. Only butt weld unions and connections may be welded, and only then in accordance with specific approved processes. If lifting eyes are to be attached, they must be clamped on.

C-2 Any union that is received from SPM attached to treating pipe or other product must be shipped back to SPM for removal if re-use is desired.

C-3 Re-threading of SPM pipe joints or other threaded vessels must be done at SPM. Proper threading and torque make up of unions are essential. Only API or SPM approved power torque make up of unions is acceptable.

C-4 Any SPM union that is assembled to a crossover sub or other threaded connection will be limited to the working pressure of the lowest rated member.

C-5 All SPM threaded components are right hand threaded unless specifically designated otherwise. Any turning counterclockwise will unscrew the components. Always make sure any threaded component is made up properly with the correct power torque make-up before pressure is applied. Contact SPM for recommendations.

C-6 Once a product has been placed in a designated service, it should remain in that service application.

C-7 All products should be properly cleaned, greased or oiled after each use and inspected prior to each use.

C-8 Pressure seal (line pipe) threads are not recommended for pulsating service above 10,000 psi or where side loading or erosion is suspected. Non-pressure seal (round tubing) threads or straight integral connections are recommended under these conditions. In order to achieve the recommended Non-Shock Cold Working Pressure, power-tight make-up is required on threaded connections. Consult the factory for any usage other than normal constant flow working conditions.

C-9 Each integral union connection is clearly marked with a pressure code (i.e. "1502", 15,000 psi). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections used must match (according to size, pressure rating, etc.). These connections must also match the service of the designated string they are installed in.

C-10 I.D. threads between the pressure seal (line pipe) and non-pressure seal (round tubing) are different. Do not attempt to mismatch these types. Failure will occur.

Inspection -Repair- Testing:

D-1 Unions should be visually inspected each time they are used. Any severe dents in the wing nut or

union half caused by misdirected hammer blows should be ultrasonic checked or replaced before use. Rolled or worn threads are unsafe and should be replaced. Unions with damaged or worn ears or lugs should be replaced.

D-2 Unions showing signs of internal washing, corrosion, acid pitting or rust should be replaced.

D-3 Strings, treating lines and equipment should have an ultrasonic check at lease twice a year. For any wall loss in the tube section above 10%, the tube should be replaced. See Engineering Data available from SPM on application and uses of treating lines where clarification is needed.

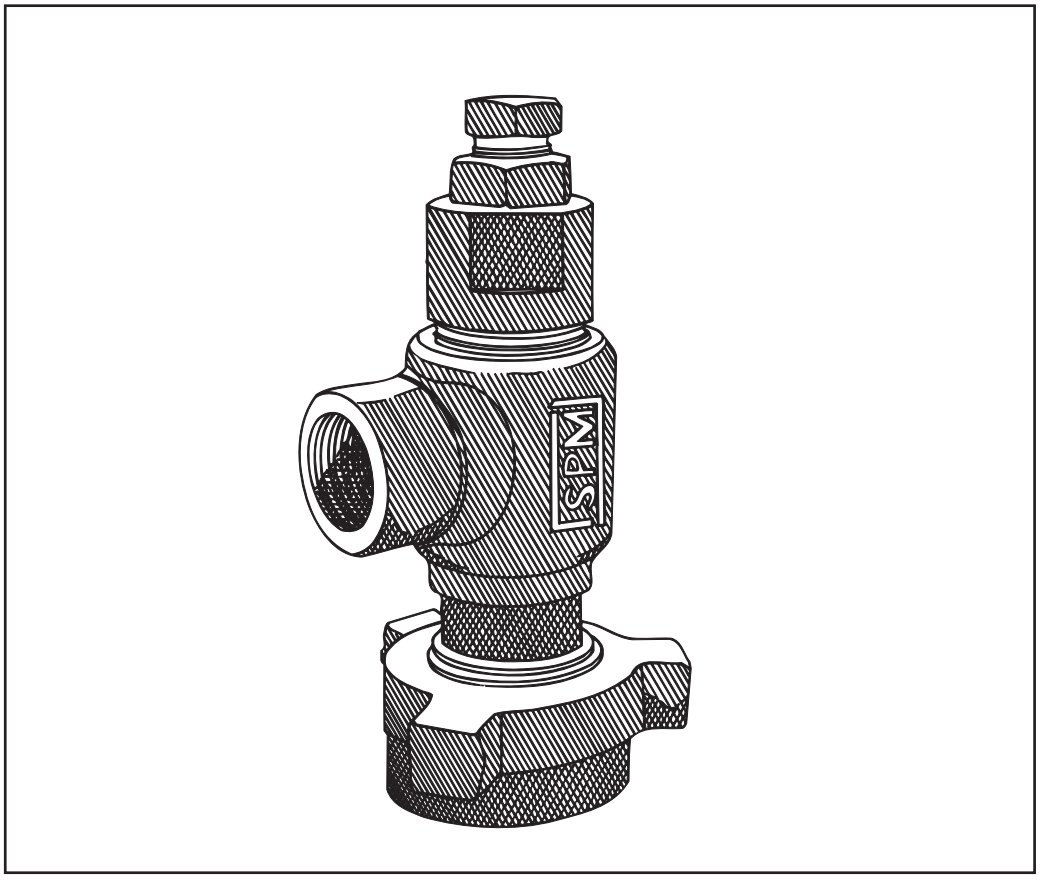
D-4 SPM also recommends that routine hydrostatic tests be performed on the hammer unions and treating pipe.

Pressure testing should be done with cold water. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!

D-5 Weld repair is prohibited for unions.

!! CAUTION !!
THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.

SPM PRODUCT SAFETY GUIDE FOR EMERGENCY RELIEF VALVES



It is critical that, since most SPM products generate, control or direct pressurized fluids, those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly.

!!WARNING!!
MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM products. This information is not meant to replace any existing Company's safety policies or practices. It is important to read and understand the "General Safety Data for all SPM Products" and the SPM Product Safety Guide for "Union and Union End Products". Both of these are available from SPM.

Personal Responsibilities:

A-1 When using these assemblies, safety glasses, approved safety shoes and hard hat must be used. Hammering and lifting these assemblies must be done with caution. Where unions are present, read and understand the SPM Safety Guide for Unions and Union Products.

A-2 Personnel should only hammer on makeup lugs and not strike union nut or valve body. Fractures can occur from repeated misuse. Excessive hammering can damage components.

A-3 Do not lift any valve that weighs in excess of 40 pounds. Use a lifting device if valves are to be used above head or when weight exceeds 40 lbs.

Proper leg lifting should be used when lifting. Back lifts should be avoided.

A-4 It is a personal responsibility to use the proper wrench to adjust SPM emergency relief valves. Direct acting valves require a substantial torque to adjust. Makeshift tools can become dislodged easily and cause an accident. It is a personal responsibility to become knowledgeable and trained in the proper use and handling of this product.

A-5 Do not hammer on, or be around valve assemblies when pressure is present.

A-6 It is recommended that SPM emergency relief valves be preset to the required relieving pressure prior to installation and use. This should be done at the factory or a qualified field shop. When setting or adjustment is required on site, care should be exercised. Adjustments should be done only by specially trained personnel under direct supervisory instruction, and only then when necessary due to application.

On Location:

B-1 Emergency relief valve unions should be clean and lightly oiled prior to each use. A visual inspection for damage should be performed at this time. Union seals should be checked and replaced when worn or damaged.

B-2 Each valve has a size and pressure code designated on the valve. Use this code for proper mating and pressure limits.

!! CAUTION !!

SINCE RELIEF VALVES MAY BE REPAINTED IN DIFFERENT COLORS FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS PRIMARY MEANS OF IDENTIFICATION.

B-3 Valve usage should be monitored by a qualified supervisor or foreman. Supervisory personnel must approve proper placement, position and handling of all valves in the system.

B-4 Emergency Relief Valves are intended as emergency "over-pressure" protection devices. Proper valve placement and pressure setting is imperative to guarantee line safety. Installation and service literature is available from SPM for this information.

B-5 Proper sizing for anticipated emergency flow rate is important. An adequate number of valves must be installed to guarantee capacity and line pressure. Service literature is available from SPM for this purpose.

B-6 The Relief Valve is designed for use in emergencies where an over-pressure situation occurs. The valve must not be the only safety device in the system. Over-pressure prime mover shutdowns are an important compliment to the relief valve. It is important that the cause for the over-pressure be corrected immediately, since continued flow over the relief valve will damage its sealing capability.

B-7 It is sometimes necessary to adjust the relief valve to the desired pressure on site. This should be done by experienced personnel under direct supervisory instructions. Caution should be exercised when field adjusting the valve; and this should never be done during the operation of a job (see service literature from SPM).

B-8 Venting flammable or explosive gases to the atmosphere through SPM emergency relief valves must be avoided. Choke manifolds are available from SPM and should be used for this purpose.

B-9 The discharge of the relief valve should be connected to a suitably sized discharge line that will direct relieved fluid to a safe area. This line must be of adequate size to minimize back pressure on the valve and have suitable pressure holding capacity in the event of a relief valve failure.

B-10 Do not position any part of your body in the path of exit flow of the valve.

B-11 Do not position the exit of any relief valve where rocks or debris may be picked up by the exit stream.

B-12 If any valve becomes plugged or does not operate properly, contact a supervisor immediately. DO NOT look into the end of the valve to check for debris, blockage, or for any other reason.

B-13 Always flush relief valve with water, then oil after each use.

Special Precautions:

C-1 Welding, brazing or heating relief valves is prohibited. Material damage will occur.

C-2 Relief valve operation sometimes require personnel to be around pressured lines. Experienced personnel should only be dispatched for this purpose. Exposure time should be a minimum. Never look into or position yourself in the path of the exit flow of the valve.

C-3 Never alternate a valve's service. Acid service should never be followed by cold temperature

service. Where acid etching or erosion is present, replace the valve.

C-4 SPM offers specially designed valves for cold temperature service, H_2S service, and aromatic service. Only valves designed and approved for these special services should be used in these applications.

Inspection and Testing:

D-1 Any alteration of the SPM Emergency Relief Valve is prohibited. Heat should not be applied for any reason. Damage will occur, which could result in injury or death.

D-2 Use only SPM repair kits for service and maintenance. Use only repair methods as outlined in SPM Relief Valve Service Literature.

D-3 Relief valves require maintenance. It is impossible to visually inspect the internal components from the outside. The valves should be disassembled and inspected often (at least every 90 days). If there are any signs of pitting or washing on the body, the valve should be replaced. Kit items should be replaced regularly (approximately every 90 days or sooner depending on type and amount of use). Always inspect all threads (especially pipe threads) and replace worn components.

D-4 Valves used in areas of high acid concentrations require special attention to inspection and maintenance. Pressure testing and ultrasonic checks should be performed every 6 months or more frequently if service is "Severe," "H_2S," or "Low Temperature."

D-5 When testing, the pressure should be applied only to inlet area.

D-6 Pressure testing should be done with cold water. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!

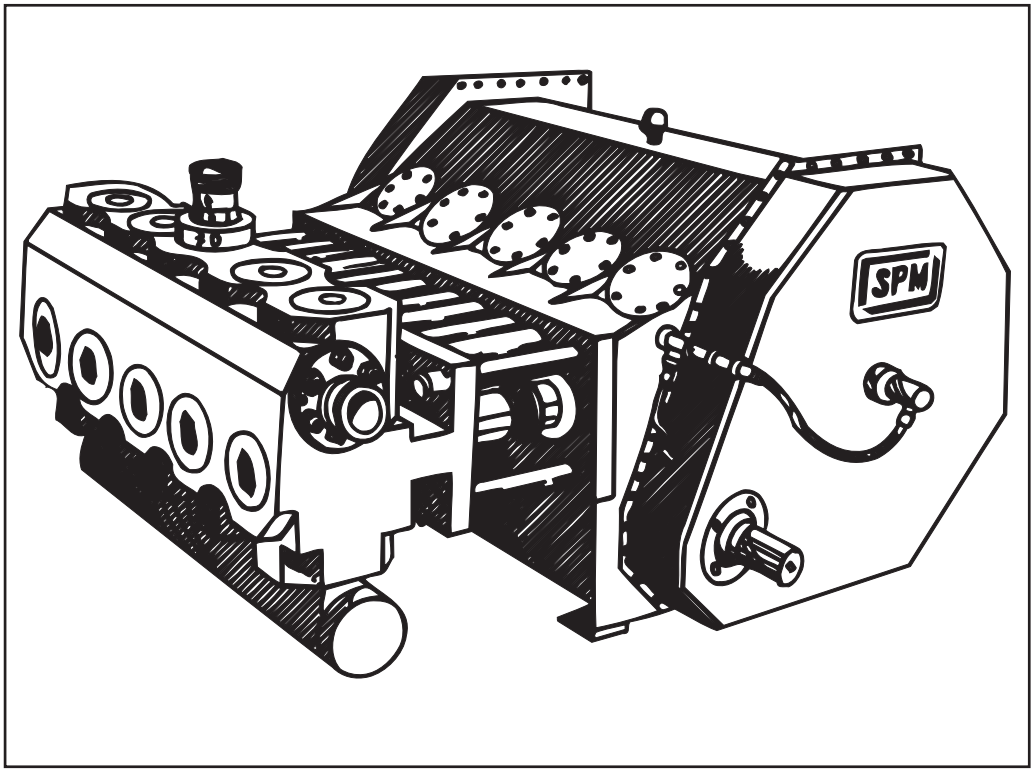
D-7 Any relief valve that has been exposed to high shock loads (i.e. overpressure, sandoffs, etc.) should be removed from service until ultrasonic checks and pressure testing can be performed.

D-8 If any abnormal situation occurs, ship valve back to SPM for an Engineering review before returning it to service.

D-9 Weld repair is prohibited for relief valves.

!! CAUTION!!
THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING SERVICE OR FIELD TESTING

SPM PRODUCT SAFETY GUIDE FOR WELL SERVICE PUMPS



It is critical, that since most SPM products generate, control or direct pressurized fluids, those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly.

!!WARNING!!
MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your SPM products. This information is not meant to replace existing Company's safety policies or practices.

Personal Responsibilities:

A-1 When working on the pump, safety glasses, approved safety shoes and hard hat must be worn. Hammering on any part or component may cause foreign material or steel slags to become airborne.

A-2 Personnel should only hammer on the SPM hammer wrench provided and never directly on the pump itself. Fractures can occur from repeated misuse. Only soft-type hammers should be used.

A-3 Personnel should never hammer on one of the valve retainer nuts or any other pump components when pressure is present. Personnel should never be around the pump when the input shaft is turning under power or the unit is under pressure.

A-4 When servicing the pump, do not lift any part in excess of 40 lbs. A lift device must be used in these cases. For parts weighting 40 lbs. or less, proper leg type lifts are essential. Do not lift with a back type lift.

A-5 It is a personal responsibility to use the proper tool when servicing the pump. Any special tools required are furnished with the pump when new, and should be kept with the pump for its routine maintenance. It is a personal responsibility to be knowledgeable and trained in the use and handling of these tools for all maintenance of the pump. A pump is made up of internal and external moving parts.

All personnel should be located away from the pump while in operation. Only trained personnel should be around the pump, especially during service or operation.

On Location:

B-1 Each pump is clearly marked with a maximum pressure rating. This pressure must not be exceeded or SERIOUS INJURY OR DEATH CAN OCCUR!

B-2 Each pump is clearly marked with a maximum horsepower rating. This horsepower rating should not be exceeded or mechanical damage can occur leading to SERIOUS INJURY OR DEATH!

B-3 The pump's discharge connections should be properly cleaned and lightly oiled before the downstream piping is attached. Any worn, damaged or missing seals should be replaced before engaging the pump's drive.

B-4 The pump's suction connections should be properly cleaned and lightly oiled before the supercharge hoses are attached. Any worn, damaged or missing seals should be replaced prior to pumping. Leaking connections can cause pump cavitation leading to equipment failure and subsequent injury or death.

B-5 Any fluid cylinder which has been pressured beyond its specified working pressure should be returned to SPM for disassembly, inspection and recertification.

B-6 Welding, brazing or heating any part of the pump is prohibited. If accessories are to be

used they are to be bolted or clamped on. Consult factory.

B-7 The use of any SPM well service pump in conjunction with the centrifugal supercharge pump feeding it will limit the maximum flow rating to that of the centrifugal or the well service pump; whichever is lower.

B-8 A complete visual inspection of the pump's power end and fluid end must be made prior to each use. Any leaking seals, broken bolts, leaking hoses or improperly tightened parts must be remedied prior to rotating the pump.

B-9 If a pump is used in a place where permanent piping is to be attached, frame flexing or structure movements must be considered. Do not place the discharge or suction connections in a bind. Inspect all components of such piping structure, including any valves, every 90 days for wash, erosion, corrosion, etc. Replace if worn.

B-10 SPM well service pumps are to be installed and operated in a horizontal position only, as shown in the pump's service manual. Operation in an extreme inclined position could cause equipment failure, leading to injuries due to improper oil flow and/or improperly sealing valves.

B-11 All personnel should maintain a safe distance from the pump when it is rotating as well as when pressure is present. Keep hands and clothing clear of unit at all times.

B-12 Any repairs or service (even routine maintenance) performed on the pump must be performed by a trained service technician who is

qualified to work on high pressure reciprocating plunger pumps. All such service and repairs must be supervised by qualified management personnel or returned to SPM for service. Only SPM replacement parts should be utilized. Failure to do so may result in loss of warranty as well as serious injury or death. SPM provides a Pump Maintenance Mechanic Training School to qualify pump service mechanics.

B-13 SPM well service pumps should never be used to pump gaseous, explosive or uninhibited corrosive fluids. These may result in equipment failure, leading to injury or death.

B-14 Never place hands in area of reciprocating pony rod or plunger path. If work must be done in this area, make sure pump is disengaged from driver prior to initiating activity.

Special Precautions:

C-1 The modifications to or unauthorized repair of any part of an SPM pump, or use of components not qualified by SPM, can lead to pump damage or failure and serious injury or death!

C-2 The pump's fluid end and related piping must always be flushed with clean water after every job. If freezing temperatures are anticipated the fluid cylinder must be completely drained of any fluid. Failure to do this may result in fluid cylinder damage from fluids which have hardened or frozen.

C-3 Personnel must clear all pumps during operation. There is a clear and ever present danger from gears and other moving parts to loose clothing,

hand, etc., that could lead to serious injury or death. Keep clear of moving or pressurized components.

C-4 All SPM threaded components are right hand threaded unless specifically designated otherwise. Any turning counterclockwise will unscrew the assembly. Always make sure any threaded component is made up properly with the proper power torque make-up.

C-5 All products should be properly cleaned, greased or oiled after each use and inspected prior to each use.

C-6 Pressure seal (line pipe) threads are not recommended for pulsating service above 10,000 psi or where side loading or erosion are suspected. Non-pressure seal (round tubing) threads or straight integral connections are recommended under these conditions. In order to achieve the recommended Non-Shock Cold Working Pressure, power-tight make-up is required on threaded connections. Consult the factory for any usage other than normal constant flow working conditions. Integral connections are recommended in lieu of pipe threaded connections for pump applications.

C-7 Each integral union connection is clearly marked with a pressure code (i.e. "1502", 15,000 psi). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections used must match (according to size, pressure rating, etc.). These connections must also match the service of the designated string they are installed in.

Inspection & Testing:

D-1 Each pump, its drive system, and its fluid piping should be visually checked each time before operating. All worn, damaged or missing parts should be remedied before starting the pump.

D-2 All fluid cylinder mounting nuts must be checked routinely with a certified torque wrench. Loose fluid cylinder mounting nuts can cause the fluid end to separate from the power end resulting in extreme injury or death.

D-3 All studs and stay rods require tightening to the proper torque. Without proper torque, the fluid end will "breathe" against the power end resulting in stud failure, stay rod failure and/or even premature fatigue failure in the power or fluid end. Consult SPM for torque information.

D-4 All covers must be tight and properly torqued. Otherwise, premature fatigue and possible fluid end or component failure can result.

D-5 All fluid cylinders must be disassembled and dimensionally inspected routinely. Any fluid cylinder which exhibits any loss in wall thickness due to washing or corrosion pitting in any area must be returned to SPM for repair and recertification prior to operating again.

D-6 All fluid cylinders must be disassembled and inspected for cracks with a suitable ultraviolet light/magnetic particle inspection device on a routine basis. The operation of any pump with even small surface cracks in any area of the fluid cylinder can result in serious injury or death.

D-7 All fluid cylinders should be hydrostatically tested at least twice each year by a qualified technician. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH! The maximum test pressure must not exceed the equipment's rated working pressure. The hydrostatic pressure test must be followed with an ultraviolet light/magnetic particle inspection of the internal bores prior to reinstalling and operating under pressure.